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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 09/759,804 | 01/12/2001 | Surajit Chaudhuri | 15-910 - 4254 | 2731 |

7590 12/30/2003

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| EXAMINER | |
|---|---|
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| ART UNIT | PAPER NUMBER |
|---|---|
| 2171 | 19 |

DATE MAILED: 12/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/759,804 | CHAUDHURI ET AL. | |
| | Examiner | Art Unit | |
| | Marc R Filipczyk | 2171 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *26 September 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-10 and 35-41* is/are pending in the application.

4a) Of the above claim(s) *38-41* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10, 35 and 36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 January 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. §§ 119 and 120**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

### *Response to Amendment*

This action is responsive to Applicant's response filed September 26, 2003 (paper # 18) in which claims 1-10, 35 and 36 remain for examination, claims 11-34 have been cancelled, and claims 38-41 are withdrawn.

### *Specification*

The abstract of the disclosure does not commence on a separate sheet in accordance with 37 CFR 1.52(b)(4). A new abstract of the disclosure is required and must be presented on a separate sheet, apart from any other text.

The abstract of the disclosure is objected to because it is not completed (see line 14). Correction is required. See MPEP § 608.01(b).

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-10, 35 and 36 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Regarding claims 1, 7, 10 and 35, the segment, "wherein the usage of a given tuple relates to a *relative frequency* with which the given tuple was accessed by the queries in the workload" was not described in the specification in such a way as to enable one skilled in the art to make or use the invention.

Regarding claims 2-6, 8 and 9 depend from 1 and 7 respectively, and therefore contain the deficiencies of those claims.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-10, 35 and 36 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 1, 7, 10 and 35, the terms "relative frequency" along with "tuple" and "workload" are indefinite. How are the terms acquired and how they interact with one another is indefinite and inconsistent.

Regarding claims 2-6, 8 and 9 depend from 1 and 7 respectively, and therefore contain the deficiencies of those claims.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 6, 7 and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by Osborn et al (U.S. Patent No 6,026,391).

Regarding claims 1, 2, 6, 7 and 9, Osborn discloses a method and medium for estimating results of a database query, the method comprising: (title)

collecting workload information related to queries that have been executed on the database (col. 6, line 44-50);

(Note: results of past queries are obtained from a database after execution of the database)

tracing query patterns of queries in the workload to identify the usage of tuples in the database during execution of the queries (col. 6, lines 23-26);

(Note: the added feature of "wherein the usage of a given tuple relates to a relative frequency with which the given tuple was accessed by the queries in the workload" is not given patentable weight because it is not supported by the disclosure)

determining sample weights based on tuple usage for each tuple (col. 6, lines 26-30);

performing a weighted sampling of the database based upon the sample weights (col. 7, lines 17-22); and

(Note: workload includes tuple usage)

executing the database query on the weighted sample to estimate results of the database query (col. 7, lines 17-22).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 3, 4 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Osborn et al (U.S. Patent No 6,026,391) in view of Acharya et al (U.S. Patent No. 6,519,604).

Regarding claims 3 and 36, Osborn discloses all of the subject matter as discussed above with respect to claims 1 and 2 including sampling but does not expressly teach computing aggregates. However, Acharya discloses an approximating querying method for databases with multiple grouping attributes (see title, Acharya) and teaches calculating aggregates (fig. 6, Acharya) for each sampled tuple (*Grouping Columns*). Hence, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to calculate aggregates in Osborn system as done in Acharya method by expanding upon Osborn's potential execution plan that is based on workload storage of characteristics for the respective tables, clusters and indexes to be used (col. 6, lines 27-29, Osborn) to further calculate and keep track of all the aggregates (attributes and characteristics) of the desired tuples (records). One of ordinary skill in the art would have been motivated to compute an aggregate over values in each sampled tuple to more precisely process sampled queries and minimize the execution and increase efficiency of the performed search.

Regarding claim 4, Osborn/Acharya teach multiplying each value by the inverse of the probability with which corresponding tuples were sampled (col. 12, lines 13-23, Acharya).

Claims 5 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Osborn et al (U.S. Patent No 6,026,391) in view of Lohman et al (U.S. Patent No. 6,356,889).

Regarding claim 5 and 8, Osborn discloses all of the subject matter as discussed above with respect to claims 1 and 7 including calculating weights (fig. 4, item 84, Osborn) but does not expressly teach weights are a function of the frequency of access of tuple. However, Lohman discloses a method for determining optimal database materialization using a query optimizer (see title, Lohman) and teaches weights are the number of queries in the workload that access the tuple (col. 6, lines 45-65, Lohman). Hence, it would have been obvious to a person of ordinary skill in the art to use weights as a function of queries in the workload that access the tuple as done by Lohman in Osborn system by storing the workload tuple information for every query and keeping track how frequently the tuples are accessed in main memory (fig. 1B, block 8, Osborn). One of ordinary skill in the art would have been motivated to track the frequency of sampled tuple to optimize the execution and efficiency of the performed search.

Claims 10 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Osborn et al (U.S. Patent No 6,026,391).

Regarding claim 10, Osborn discloses a system for estimating results of a database query, the method comprising: (title)

a module collecting workload information related to the database (fig. 2, 46);

a module tracing query patterns of queries in the workload (fig. 2, 42) to identify the usage of tuples in the database during execution of the queries (fig. 2);

a module determining sample weights based on tuple usage (fig. 2, 46);

a module performing a weighted sampling of the database based upon the sample weights (fig. 2, 46); and

a module executing the database query on the weighted sample to estimate results of the database query (fig. 2, 46).

The two modules listed above perform the tasks of the 4 modules claimed. However, although the modules are implemented differently it is the user's choice to derive a functional implementation that processes and returns the same results. Hence, it would have been obvious to a person of ordinary skill in the art at the time the invention was made having Osborn's two modules to modify them so that they could be implemented with two additional modules, where all four modules would perform the tasks of the two original modules. One would have been motivated to use additional modules to perform the same function to divide the work among different applications, to gain processing speed.

Regarding claim 35, Osborn discloses a method and medium for estimating results of a database query, the method comprising: (title)

collecting workload information related to queries that have been executed on the database (col. 6, line 44-50);

(Note: results of past queries are obtained from a database after execution of the database)

tracing query patterns of queries in the workload to identify the usage of tuples in the database during execution of the queries (col. 6, lines 23-26);

(Note: the added feature of "wherein the usage of a given tuple relates to a relative frequency with which the given tuple was accessed by the queries in the workload" is not given patentable weight because it is not supported by the disclosure)

determining sample weights based on tuple usage for each tuple (col. 6, lines 26-30);

performing a weighted sampling of the database based upon the sample weights (col. 7, lines 17-22); and

(Note: workload includes tuple usage)

executing the database query on the weighted sample to estimate results of the database query (col. 7, lines 17-22).

Osborn does not expressly teach generating an outlier index. However, it is common to the ordinary skill in the art of computational statistics to derive and manipulate data "outside the box". Having all the workload information, one of ordinary skill in the art would have been motivated to generate and account for outlier indexes in order to obtain accurate results based on the entire data.

***Response to Arguments***

Applicant's arguments filed on September 26, 2003 have been fully considered but they are not persuasive. The arguments and responses are listed below.

Applicant argues in the 9/26/03 response that the amended claims are now patentable over the previous rejection.

In response to Applicant's argument, Examiner disagrees. The added feature to all the dependent claims of "wherein the usage of a given tuple relates to a relative frequency with which the given tuple was accessed by the queries in the workload" was not described in the specification in such a way as to enable one skilled in the art to make or use the invention. Thus, the added new feature and arguments based on that feature are void. Further, Examiner makes note that Osborn system is based on executing and deriving result sets from a database (see abstract, Osborn).

With respect to all the pending claims 1-10, 35 and 36, Examiner respectfully traverses Applicant's assertion based on the discussion cited above, as such, Examiner maintains the same rejections.

***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marc R Filipczyk whose telephone number is 703-305-7156. The examiner can normally be reached on Mon-Fri, 8am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Safet Metjahic can be reached on 703-308-1436. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

MF
December 28, 2003

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